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Date: June 1, 2004

Jonathan A. Platt

Attorney Docket No. ERICP0328USA PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Applicants: Gregel et al.

Serial No.: 10/081,376

Filed: February 21, 2002

Title: REINFORCING BAR CONNECTION AND METHOD

Examiner: John P. Fitzgerald

Art Unit: 3637

TRANSMITTAL OF APPEAL BRIEF AND AMENDMENT ACCOMPANYING APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

In accordance with the Notice of Appeal filed on March 30, 2004, attached is the Applicant's Appeal Brief with appendices (in triplicate), and an Amendment Accompanying Appeal Brief, for filing with the U.S. Patent & Trademark Office in connection with the above patent application. Also enclosed is a check for **$330.00** for the fee for filing an appeal brief. If any additional fee is required, please charge the fee to Deposit Account No. 18-0988, Order No. ERICP0328USA.

Respectfully submitted,
RENNER, OTTO, BOISSELLE & SKLAR, LLP

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APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

INTRODUCTION

This is an appeal from a final rejection of claims 1-13, 20-22, and 26, as obvious, based on combinations of references. The primary reference is a crimped socket rebar connector totally different in principal from the claimed invention, which involves spring finger washers that bite into and grip reinforcing bar ends. The rejections rely on impractical and unrealistic proposed combinations of the primary reference with other disparate references, some of which are not connectors at all.

REAL PARTY IN INTEREST

The real party is the assignee of the application, Erico International Corporation.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

STATUS OF THE CLAIMS

Claims 1-15, 20-22, and 26 are pending. Of these, claims 1-13, 20-22, and 26 stand rejected, and claims 14 and 15 stand withdrawn from consideration. Claims 16-19 and 23-25, which were drawn to a non-elected species, have been canceled.

An amendment is submitted herewith, correcting minor informalities in the claims. The pending claims on appeal, reflecting the changes in the accompanying amendment, are set forth in the attached Appendix A. The claims prior to the amendment are set forth in Appendix B.

STATUS OF AMENDMENTS

As noted above, an amendment is submitted herewith, correcting minor informalities in the claims.

SUMMARY OF THE INVENTION

A reinforcing bar connection for concrete construction utilizes a sleeve supporting internal spring washers having flexible inner edges which engage a bar inserted in the sleeve. The reinforced inner edges of the washers bite into the bar and grip the bar preventing withdrawal. The washers have openings which permit the sleeve to be filled with a hardenable matrix such as grout or resin. Shoulder forming wedge grooves may be formed in ends of the sleeve. The connection provides not only high compressive and tensile strengths but also will provide the dynamic and/or fatigue characteristics to qualify as a Type 2 coupler approved for use in all United States earthquake zones.

A coupling sleeve 20 is generally cylindrical and is provided with a through hole 21 extending from end to end. The sleeve 20 has grooves 30-35 and 44-49 for receiving spring finger washers 36-41 and 52-57, which have their fingers shown generally at 42 oriented toward the mid-point of the sleeve 20 (toward the stop washer

23). The ends of the sleeve 20 beyond the uniform wall thickness center section are provided with tapered wedge shaped grooves 62-64 and 66-68. The wedge shaped grooves 62-64 and 66-68 form right angle stop shoulders 70-72 and 74-76. An interior groove 22 at the center of the sleeve is adapted to receive a stop washer or stop disc 23, which provides a stop for reinforcing bars 25 and 26 inserted into the sleeve 20. The sleeve 20 may be provided with small ports 80 and 81 on each side of the center stop washer or disc 23, to permit a hardenable matrix such as grout or epoxy resin, for example, to be injected into the sleeve after the bars 25 and 26 are in place. Page 3, line 17 - page 4, line 25; Figs. 1-4.

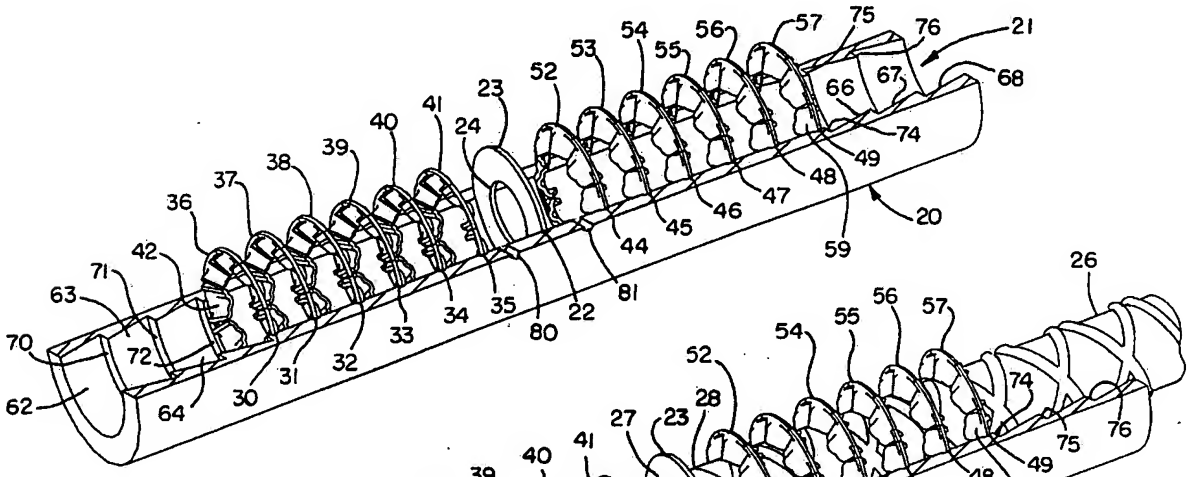


FIG. 1

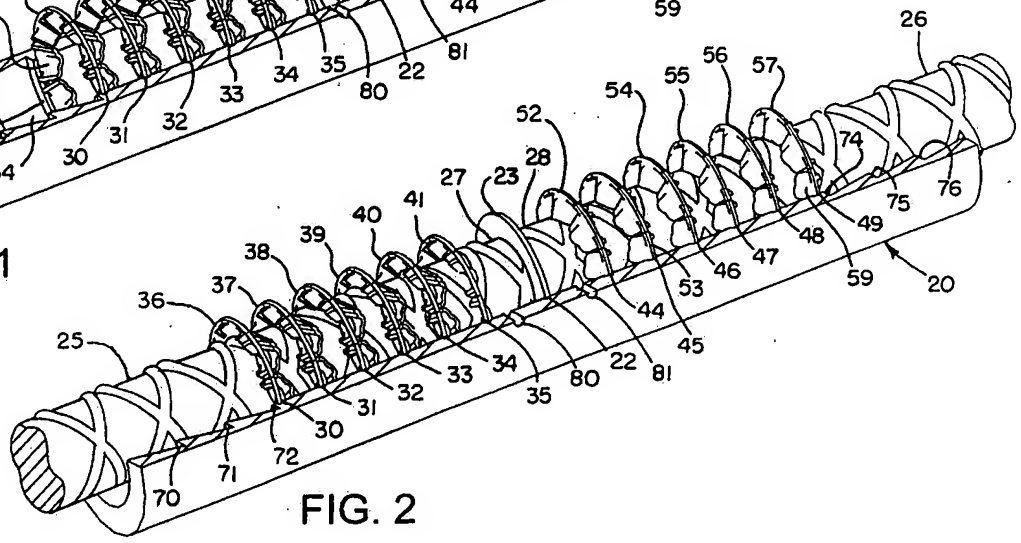


FIG. 2

Because of the orientation of the fingers, the reinforcing bar shown at 25 may be inserted into one end of the sleeve 20, and the fingers 42 of the spring finger washers 36-41 will deflect toward the center of the coupling, permitting the bar 25 to be inserted until the bar end 27 abuts against the center stop disc 23. The opposite orientation of the fingers of the washers 52-57 on the opposite side permits the same thing with regard to the bar 26 and its bar end 28. Thus, both bars 25 and 26 may be readily inserted into the opposite ends of the sleeve 20 to abut against the center stop disc 23. However, the reinforced fingers of the washers 36-41 and 52-57 bite into the bar exterior surfaces and preclude withdrawal of the bar ends 27 and 28. When the sleeve 20 is filled with the hardenable matrix such as the grout or epoxy, the splice is complete. Page 4, line 26 - page 5, line 13.

The spring finger washers 36-41 and 52-57 each are provided with a circular rim 124, which fits within the appropriate groove inside the sleeve 20. The washer 36 may be provided with eight inwardly projecting reinforced fingers 126-133. Each finger is separated from the adjacent fingers by substantially open V-shape windows 135-141, which provide substantial openings through the spring finger washers to permit the hardenable matrix to flow around a reinforcing bar inserted into the connection and axially along the sleeve 20. The windows or openings 135-141 are formed by bending the inwardly projecting edges of each finger. The radially extending bent edges of the fingers are provided with a pointed or chiseled edge, 146 and 147, respectively, configured to bite into the bar

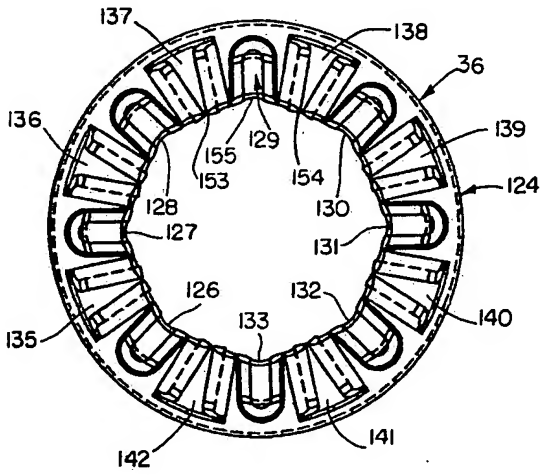


FIG. 8

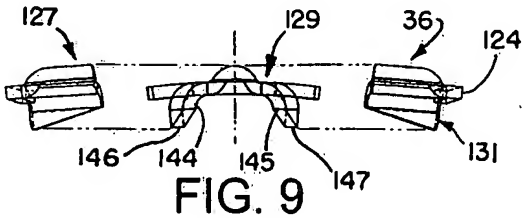


FIG. 9

as the inner edge of the finger deflects due to bar insertion. Page 6, line 30 - page 7, line 22; Figs. 8-12.

When the washers are inserted in the mounting grooves in the interior of the sleeve and properly oriented, the fingers will be positioned to deflect as a bar is inserted, but bite into that bar to prevent withdrawal. The filling of the sleeve with a hardenable matrix such as the noted grout or resin completes the connection to form a connection having not only high compression and tensile strength, but also sufficient fatigue strength or characteristics to complete the cycle tests to qualify as a Type 2 coupler useful anywhere in any structure in any of the earthquake zones of the United States. Page 7, lines 23-30.

ISSUES

Issue One

Whether claims 1-3 and 13 are properly rejected under 35 USC 103(a) as obvious over German Patent Publication DD 222 374 A1 ("Schade") in view of Dobell, U.S. Patent No. 2,781,658 ("Dobell").

Issue Two

Whether claims 4, 5, 9-12, and 26 are properly rejected under 35 USC 103(a) as obvious over Schade in view of Dobell, further in view of UK Patent Publication GB 2 034 857 A ("Lande").

Issue Three

Whether claims 6-8, 11, 12, and 20-22 stand rejected under 35 USC 103(a) as obvious over Schade in view of Dobell and Lande, and further in view of UK Patent Publication GB 2 192 210 A ("Kadota").

GROUPING OF CLAIMS

With regard to Issue One, the claims are grouped as follows: a) claims 1, 2, and 13; and b) claim 3.

With regard to Issue Two, the claims are grouped as follows: a) claims 4, 5, and 9-12; and b) claim 26.

With regard to Issue Three, the claims are grouped as follows: a) claims 6-8, 11, and 12; and b) claims 20-22.

ARGUMENT

ISSUE ONE

The Examiner contends that claims 1-3 and 13 are obvious over German Patent Publication DD 222 374 A1 ("Schade") in view of Dobell, U.S. Patent No. 2,781,658 ("Dobell"), despite the fact that Schade is a totally different type of connector relying on crimping of a connector body to hold bar ends in place, Dobell does not disclose a connector at all, and there would have no reason to combine Schade and Dobell in the way suggested by the Examiner.

Schade discloses a crimped or press-on socket connector for joining steel rebar.[1] According to Schade, hardened metal rings 3 may be pushed onto a smooth rebar 1 in order to achieve a better force transfer between the rebar 1 and a socket 4 that is crimped onto the rebar 1. (Fig. 1 of Schade is reproduced on the next page.) Accordingly, after the hardened rings 3 are put in place, the smooth rebar 1 may then be joined to a ribbed rebar 2 by pushing a connecting socket 4 over the joint between the rebars 1 and 2, and by pressing or crimping the socket 4 onto the bars 1 and 2 in stages. Reference number 41 in Schade indicates a completed pressed portion of the socket 4, while reference number 42 indicates an as-yet-unpressed portion of the socket 4. Prior to the pressing, the socket 4 has a smooth inner surface, as can be

[1]A translation of Schade is attached hereto as Appendix C.

seen in Fig. 1 of Schade. Schade does not disclose placement of the hardened rings 3 into the socket 4 prior to insertion of the smooth rebar 1 into the socket 4, nor does Schade disclose any means for maintaining the rebars or metal rings in the socket 4 prior to the pressing or crimping process.

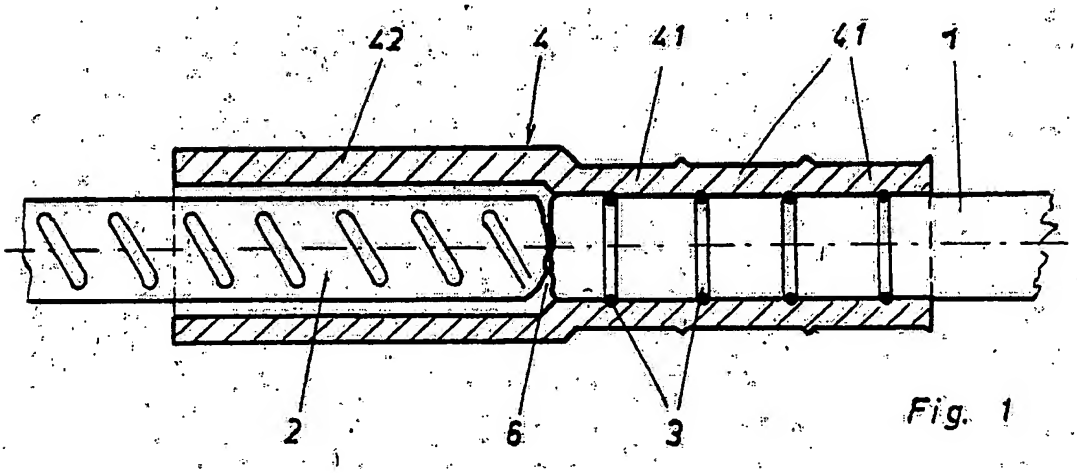


Fig. 1

Dobell discloses a post-stressed concrete structure that includes end anchorages 11-16 for maintaining tension, initially placed by a hydraulic jack, in reinforcing rods 17-19. (Figs. 1 and 2 of Dobell are reproduced on the next page.) Dobell discloses that within each of the anchorages there is a stack or nest of pronged plates 35, separated by washers 36. The pronged plates 35 are configured to allow the ends of the rods 17-19 to be pulled outward under the tension of the hydraulic jack, and to maintain the tension after the hydraulic jack is removed, with prongs 37 of the pronged plates 35 preventing the rod ends from being pulled back into the concrete slab. The prongs 37 of the plates 35 apparently do not automatically grip the rods 17-19. Rather gripping is engaged by tightening a screw cap 38, which tilts the pronged plates 35, causing their prongs 37 to grip the rods 17-19. Col. 6, lines 60-74; Fig. 2. Once a desired tension has been applied to the rods 17-19, the ends of the rods are cut off adjacent to the end anchorages. Col. 7, lines 10-23. Dobell does not disclose a

reinforcing bar connector or other type of mechanism for coupling together ends of objects.

Fig. 1.

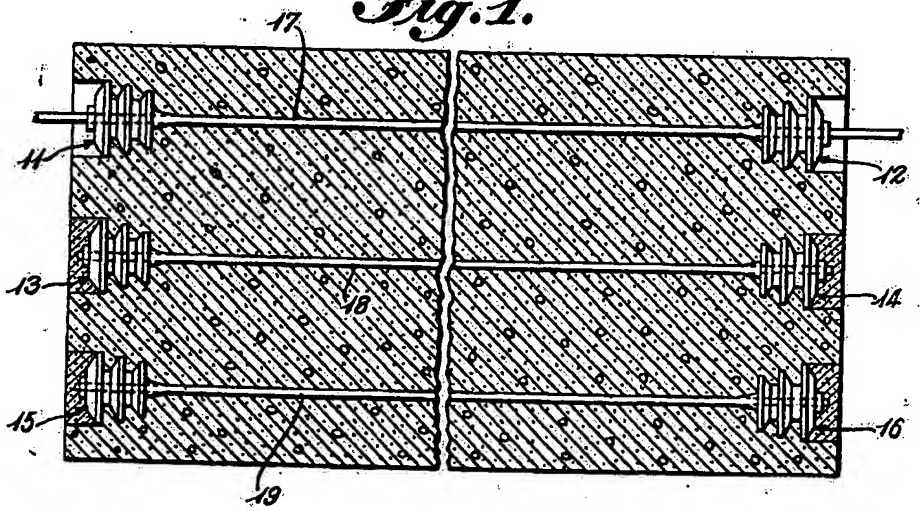
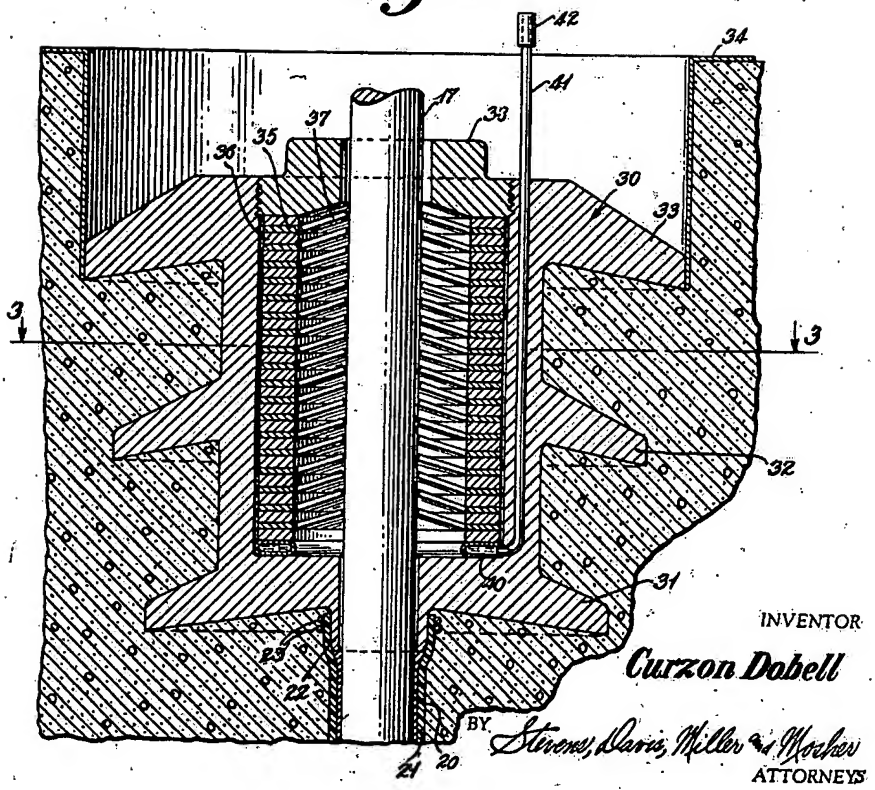


Fig. 2.



Claim 1 recites a reinforcing bar connection for joining reinforcing bars end-to-end, the connection including a sleeve and spring finger washers mounted in the sleeve, wherein the washers each have a flexible inner edge adapted to expand around reinforcing bar ends projecting into each end of said sleeve and to bite into and grip the bar ends to prevent withdrawal. Claim 1 is patentable over Schade and Dobell at least because it would not have been obvious to modify Schade's crimped press-on socket connector to include Dobell's pronged plates. As is evident from the above description, Schade's press-on socket connector is a totally different type of connector than the claimed reinforcing bar connection. The function of Schade's hardened rings 3 is to provide some texture to the smooth rebar 1, to allow gripping by the crimped or pressed on portions 42. The hardened rings 3 do not bite into the smooth rebar 1, and are held in place by the crimped portions of the socket 4 between the hardened rings 3. There would be no reason to substitute Dobell's pronged plates 35 for Schade's hardened rings 3, at least because the one-way biting action of Dobell's pronged plates is not needed in Schade's connector. Prior to the crimping of Schade's socket 4, the hardened rings 3 are not in contact with the socket 4, and there are no grooves or other structures in the socket 4 to hold the hardened rings 3 in place. Thus the hardened rings 3 do not function by themselves to hold the rebar 1 in place, but rather work only in conjunction with the crimped portions of the socket 4. There would be no reason to substitute Dobell's pronged plates 35 for Schade's hardened rings 3, since Dobell's pronged plates would not function either to hold the Schade's rebar 1 in place relative to the socket 4, due to the pronged plates 35 being unable to engage the smooth inner surface of Schade's socket 4.

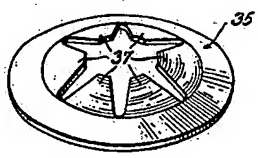
Further, if Dobell's pronged plates 35 were substituted for Schade's hardened rings 3, the crimping or pressing of Schade's socket 4 would destroy the integrity and structure of the pronged plates, rendering them unable to perform their intended function. The pronged plates 35 are made of flexible material. Col. 6, lines 55-59; *see also* col. 6, lines 69-73. Pressing or crimping of Schade's thick socket 4 would not

leave such flexible structures intact, but would rather crush them. Crushing of the prong plates 35, if they were to be placed in Schade's socket 4, would bend them various unpredictable ways, which would almost certainly cause the prongs 37 to come out of contact with the smooth rebar 1. This would prevent the pronged plates 35 from performing their intended function of gripping.

For these reasons it would not have been obvious to make the proposed combination of Schade and Dobell. Therefore claims 1-3 and 13 are patentable over Schade and Dobell.

Further, dependent claim 3 recites that fingers of the spring finger washers have generally channel-shape cross-section formations. Examples of such channel shapes are shown in Fig. 9 of the present application, reproduced earlier. Dobell's pronged plates 35 have no such channel shapes, as can be seen from Fig. 4 of Dobell. Since claim 3 includes an additional feature not taught or suggested by Schade or Dobell, claim 3 is patentable over Schade and Dobell for another reason.

Fig. 4.



ISSUE TWO

The Examiner contends that claims 4, 5, 9-12, and 26 are obvious over Schade in view of Dobell, further in view of UK Patent Publication GB 2 034 857 A ("Lande"), despite Lande's failure to make up for the deficiencies of Schade and Dobell, and despite a lack of motivation for combining Lande with Schade and Dobell.

Lande discloses a connector for concrete reinforcing bars. Ends of the reinforcing bars 12 and 14 are placed into a cast steel sleeve 10 that has a plurality of grooves 18 along an inner surface. A resin is then injected into the sleeve 10 through apertures 28.

Lande does not remedy the defects discussed above with regard to the proposed combination of Schade and Dobell. For this reason alone claims 4, 5, 9-12, and 26 are patentable over Schade, Dobell, and Lande.

In addition, it would have not have been obvious to modify's Schade's socket connector to include Lande's grooves 18 and resin. There would be no reason to include Lande's grooves in Schade's press-on socket 4, since the grooves would be crushed in the crimping process, and might hinder sliding of the rebar 1 (with the hardened rings 3) into the socket 4. There would also be no reason to introduce resin into Schade's socket 4. Schade's connector relies on crimped or deformed metal of the socket 4 to maintain the rebar 1 and the hardened rings 3 in the socket. Given the holding power of Shade's crimped socket, why would anyone add resin?

A further problem with the proposed introduction of resin into Schade's socket 4 is the impracticality of the proposed addition of resin. Would the resin be added before or after the crimping of the socket 4? If resin is added before the crimping, then crimping would squeeze resin out of the socket 4, making an undesirable mess of the installation process. On the other hand, it would be impractical, if not impossible, to try to introduce a resin after crimping of Schade's socket 4. Once the socket 4 is crimped (see Schade's Fig. 1), there would be no room to flow resin around the rebar 1 and the hardened rings 3, since the crimped portion 41 of the socket 4 presses close up against the rebar 1 and the hardened rings 3. Any way you slice it, it would be impractical to try to combine Lande's resin with Schade's crimped connector. Thus for another reason claims 4, 5, 9-12, and 26 are patentable over Schade, Dobell, and Lande.

In addition, none of the applied references teach or suggest claim 26's recited feature of outer edges of spring finger washers in grooves of a sleeve. Schade's socket 4 does not have grooves for receiving spring washers or anything else. Dobell's pronged plates 35 are not secured in grooves in a sleeve, but rather are clamped between a series of washers 36. Col. 6, lines 45-49. While Lande does disclose sleeve segments with grooves 18, there is no teaching or suggestion for placing spring

finger washers in Lande's grooves. Since none of the applied references teach or suggest the additional features recited in claim 26, for still another reason claim 26 is patentable over Schade, Dobell, and Lande.

For at least the above reasons claims 4, 5, 9-12, and 26 are patentable over Schade, Dobell, and Lande.

ISSUE THREE

The Examiner rejects claims 6-8, 11, 12, and 20-22 as obvious over Schade in view of Dobell and Lande, and further in view of UK Patent Publication GB 2 192 210 A ("Kadota"), despite Kadota's failure to make up for the deficiencies of the various sub-combinations of the references, and the failure of any of the references to teach or suggest inserting bar ends into a sleeve so that washers in the sleeve bite and grip the bar ends.

Kadota discloses a one-piece cast iron shell 10 for containing a pair of reinforcing bars 20 and 29. The shell 10 has a grouting port 14 and a vent port 13 to facilitate filling the shell with a grout 34 to secure the bars 20 and 29 within the shell 10.

Kadota does not make up for the deficiencies discussed above with regard to the proposed combinations of Schade and Dobell, and Schade, Dobell, and Lande. Therefore claims 6-8, 11, 12, and 20-22 are patentable over Schade, Dobell, Lande, and Kadota.

In addition, claim 20 recites a method that includes inserting a bar end in each end of a sleeve to deflect flexible inner edges of washers, so that the inner edges of the washers bite into and grip bar ends. None of the references teach or suggest this feature. Schade discloses placing the hardened rings 3 on the smooth rebar 1 before the rebar is inserted into the socket. Dobell does not disclose connecting reinforcing bars, and does not disclose a sleeve with bars inserted in each end. Further, Dobell does not disclose inserting rods so that the pronged plates 35 bite into and grip them, but rather uses a separate gripping operation that involves screwing down a pressure

cap 38 (col. 6, lines 60-73). Lande and Kadota do not disclose flexible washers that deflect and bite into bar ends. Since none of the references teach or suggest the recited features of claim 20, for an additional reason claims 20-22 are patentable over Schade, Dobell, Lande, and Kadota, either alone or in combination.

For at least the above reasons claims 6-8, 11, 12, and 20-22 are patentable over Schade, Dobell, Lande, and Kadota.

CONCLUSION

In view of the foregoing, it is respectfully requested that the Board reverse the rejection of applicants' claims as obvious under 35 U.S.C. 103(a) in view of the applied references.

This Brief is submitted in triplicate.

Respectfully submitted,

RENNER, OTTO, BOISSELLE & SKLAR, LLP

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APPENDIX A – claims after entry of accompanying amendment

1. A reinforcing bar connection for joining two reinforcing bars end-to end for use in reinforced concrete construction, comprising:

a sleeve, and

spring finger washers mounted in said sleeve,

wherein the washers each have a flexible inner edge adapted to expand around reinforcing bar ends projecting into each end of said sleeve and to bite into and grip the bar ends to prevent withdrawal.

2. A reinforcing bar connection as set forth in claim 1 including at least two sets of spring finger washers in said sleeve oppositely arranged to bite into and grip said bar ends inserted in each end of said sleeve.

3. A reinforcing bar connection as set forth in claim 2 wherein fingers of the washers include generally channel-shape cross-section formations.

4. A reinforcing bar connection as set forth in claim 1 including a hardenable matrix filling said sleeve after the bar is inserted, and wherein said spring finger washers include openings when said bar ends are inserted to enable said hardenable matrix to flow past said washers.

5. A reinforcing bar connection as set forth in claim 4 wherein said hardenable matrix is a resin.

6. A reinforcing bar connection as set forth in claim 4 wherein said hardenable matrix is a grout.

7. A reinforcing bar connection as set forth in claim 2 including a stop-

washer inserted in said sleeve to limit the extent of insertion of said bar ends inserted into the sleeve.

8. A reinforcing bar connection as set forth in claim 7 wherein said stop washer includes a central hole having a diameter less than that of the bar ends.

9. A reinforcing bar connection as set forth in claim 8 wherein the outside of each spring washer is mounted in a groove in said sleeve.

10. A reinforcing bar connection as set forth in claim 4 including at least one wedge-shape groove in the interior of said sleeve at an end thereof forming a shoulder facing the end.

11. A reinforcing bar connection as set forth in claim 10 wherein a wedge surface of said wedge-shape groove tapers to a smaller diameter toward the end of the sleeve and the shoulder is formed at the larger diameter.

12. A reinforcing bar connection as set forth in claim 11 including a plurality of wedge-shape grooves and shoulders at each end of the sleeve.

13. A reinforcing bar connection as set forth in claim 2 including from about three to about ten or more oppositely arranged washers in each set in each end of the sleeve.

14. A reinforcing bar connection as set forth in claim 1, further comprising a flange attached to one end of the sleeve.

15. A reinforcing bar connection as set forth in claim 14, wherein the flange has holes therein.

20. A method of connecting reinforcing bar in reinforced concrete construction, the method comprising arranging spring washers in a sleeve so as to provide a set of spring washers oppositely arranged in each end of said sleeve, said washers having a flexible inner edge, inserting a bar end in each end of said sleeve to deflect said washers so that the inner edge of said washers bites into and grips the bar ends to prevent withdrawal.

21. A method as set forth in claim 20 including the step of providing wedge grooves in each end of the sleeve, and filling the sleeve with a hardenable matrix.

22. A method as set forth in claim 20 including the step of providing at least two wedge grooves and shoulders in each end of the sleeve, and at least three washers in each end of the sleeve.

26. A reinforcing bar connection as set forth in claim 12,

wherein the sleeve includes additional grooves, and

wherein outer edges of the spring finger washers are mounted in respective of the additional grooves.

APPENDIX B – claims prior to entry of accompanying amendment

1. A reinforcing bar connection for joining two reinforcing bars end-to end for use in reinforced concrete construction, comprising:

a sleeve, and

spring finger washers mounted in said sleeve,

wherein the washers each have a flexible inner edge adapted to expand around reinforcing bar ends projecting into each end of said sleeve and to bite into and grip the bar ends to prevent withdrawal.

2. A reinforcing bar connection as set forth in claim 1 including at least two sets of spring finger washers in said sleeve oppositely arranged to bite into and grip said bar ends inserted in each end of said sleeve.

3. A reinforcing bar connection as set forth in claim 2 wherein said fingers include generally channel-shape cross-section formations.

4. A reinforcing bar connection as set forth in claim 1 including a hardenable matrix filling said sleeve after the bar is inserted, and wherein said spring finger washers include openings when said bar ends are inserted to enable said hardenable matrix to flow past said washers.

5. A reinforcing bar connection as set forth in claim 4 wherein said hardenable matrix is a resin.

6. A reinforcing bar connection as set forth in claim 4 wherein said hardenable matrix is a grout.

7. A reinforcing bar connection as set forth in claim 2 including a stop-washer inserted in said sleeve to limit the extent of insertion of said bar ends inserted into the sleeve.

8. A reinforcing bar connection as set forth in claim 7 wherein said stop washer includes a central hole having a diameter less than that of the bar ends.

9. A reinforcing bar connection as set forth in claim 8 wherein the outside of each spring washer is mounted in a groove in said sleeve.

10. A reinforcing bar connection as set forth in claim 4 including at least one wedge-shape groove in the interior of said sleeve at an end thereof forming a shoulder facing the end.

11. A reinforcing bar connection as set forth in claim 10 wherein a wedge surface of said wedge-shape groove tapers to a smaller diameter toward the end of the sleeve and the shoulder is formed at the larger diameter.

12. A reinforcing bar connection as set forth in claim 11 including a plurality of wedge-shape grooves and shoulders at each end of the sleeve.

13. A reinforcing bar connection as set forth in claim 2 including from about three to about ten or more oppositely arranged washers in each set in each end of the sleeve.

14. A reinforcing bar connection as set forth in claim 1, further comprising a flange attached to one end of the sleeve.

15. A reinforcing bar connection as set forth in claim 14, wherein the flange has holes therein.

20. A method of connecting reinforcing bar in reinforced concrete construction, the method comprising arranging spring washers in a sleeve so as to provide a set of spring washers oppositely arranged in each end of said sleeve, said washers having a flexible inner edge, inserting a bar end in each end of said sleeve to deflect said washers so that the inner edge of said washers bites into and grips the bar ends to prevent withdrawal.

21. A method as set forth in claim 20 including the step of providing wedge grooves in each end of the sleeve, and filling the sleeve with a hardenable matrix.

22. A method as set forth in claim 20 including the step of providing at least two wedge grooves and shoulders in each end of the sleeve, and at least three washers in each end of the sleeve.

26. A reinforcing bar connection as set forth in claim 12,
wherein the sleeve includes additional grooves, and
wherein outer edges of the spring washer are mounted in respective of the additional grooves.

German Democratic Republic

(12) Commercial Patent

Patent Disclosure

(19) **DD** (11) **222 374 A1**

Granted in accordance with § 17 Section 1 of the Patent Code

OFFICE FOR INVENTIONS AND PATENTS

Published in the version submitted by the claimant.

(21) WP E 04 C / 256 660 7
(22) 14 November 83
(44) 15 May 85

(71) VEB BMK Süd, KB Industriebau Karl-Marx-Stadt, 9010 Karl-Marx-Stadt, Hilbersdorfer Strasse 23, DD
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(54) Pressed-on Connecting Socket for Reinforcing Bars

(57) The invention concerns a press-on connecting socket for axial butt joints of steel reinforcing bars of equal or unequal diameters. The objective of the invention is the maximum transfer of the mean tensile strength of the non-butted steel across butt joints of smooth reinforcing bars as well as butt joints between smooth and ribbed steel reinforcing bars. The invention addresses the problem of achieving an increase of the friction between the socket and the steel rebar in joints with pressed-on connecting sockets. According to the invention, this is achieved by hardened metal rings (3) located between the rebar and the connecting socket (4), where the interior diameter of the rings corresponds to the exterior diameter of the rebar (1) on which they are placed. Fig.1

ISSN 0433-6461

Title of the invention:
Press-on Connecting Socket for Concrete Rebar

Area of application of the invention:
The invention concerns a pressed-on connecting socket for axial butt joints of steel reinforcing bars of equal or unequal diameters. It can be used for smooth as well as for ribbed rebar, and also for attaching sockets to pipes, cables, ropes, or for similar purposes.

Characteristics of known technical solutions:
When using a pressed-on socket connector for joining steel rebar, the objective is a transfer of the tensile strength of the non-butted rebar that is as close to 100 percent as possible, in order to fully exploit the strength of the rebar even at the butt joint. In order to achieve this, DE – OS 1 806 665 proposes to press a steel socket with a lower hardness than that of the rebar onto the rebar step-by-step in order to join ribbed rebar. This causes the steel to flow in between the ribs of the rebar, resulting in a secure coupling.

In cases where it is necessary to join smooth rebar by means of pressed-on connecting sockets, DE – AS 1 264 025 proposes the use of a socket with interior ribs that is harder than the rebar to be joined so that, when the socket is pressed on, its interior ribs are pressed into the rebar, ensuring a secure force transfer without slippage. The disadvantage of this solution is the high manufacturing cost of this type of socket that makes this type of joint more expensive. In addition, there are problems when it comes to joining smooth and ribbed rebar, because the ribbed rebar is harder and there is no guarantee that the steel of the socket will flow in between the ribs of the rebar when the socket is pressed on.

In order to increase the friction between the rebar and the connecting socket, DE – OS 2 720 642 proposes to sprinkle hard granulate between the rebar and the socket prior to the pressing process during which the granulate imbeds itself in both the rebar and the socket. This process can not be used at the construction site because a uniform distribution of the granulate is impossible there, with the consequence that there is no uniform force transfer at the butt joint which, in turn, reduces the tensile strength of the joint.

Objective of the invention:
The invention has the purpose of developing a pressed-on connecting socket that permits a high transfer of the tensile strength across joints of smooth rebar as well as across joints of smooth and ribbed rebar, and that can also be used for joining rebar of unequal diameter.

Characteristics of the invention:
The invention addresses the problem of achieving a force transfer between the rebar and the socket that can be fully adapted to the individual requirements, and to accomplish this with a socket of the shortest possible length that makes it possible to produce such joints on-site at construction sites.

The invention solves this problem by proposing the insertion of hardened metal rings between the rebar to be joined and the pressed-on connecting socket. The metal rings can be placed on one or on both sides of the butt joint, and they are always put in place when the surfaces of the rebar and the socket to be pressed together are not ribbed. If rebar of unequal diameter is to be joined, an additional sleeve that compensates for the difference in diameter is pressed onto the rebar of smaller diameter, using metal rings if necessary. Then, a connecting socket is placed over the joint, and metal rings are inserted between the smooth interior surface of the socket and the smooth surface of the rebar as well as the smooth surface of the compensating sleeve.

Sample version:
The invention is described in detail with the help of a sample version. On the page of drawings,
Fig. 1 shows the joint between a ribbed reinforcing bar and a smooth reinforcing bar of equal diameter;
Fig. 2 shows the joint between two smooth reinforcing bars of unequal diameter.

As shown in Fig. 1, when a smooth reinforcing bar 1 is joined with a ribbed reinforcing bar 2 of equal diameter, several hardened metal rings 3 whose interior diameter corresponds to the diameter of the rebar are pushed onto the rebar 1 where they are held in place by friction. Then, a connecting socket 4 is pushed over the butt joint 6 and is pressed on step-by-step. The completed steps of the pressing process are indicated by 41, while 42 indicates the section of the connecting socket 4 that has not been pressed on yet. The press-fitting of the connecting socket 4 can be done during the fabrication of the rebar already so that on site it only needs to be pressed onto the rebar to be attached.

For joining two reinforcing bars of unequal diameter with a connecting socket, Fig. 2 illustrates the variant involving two smooth steel bars. First, appropriate metal rings 31 are placed on the bar with smaller diameter; then, a sleeve 5 is pressed on to it so that now both bars have the same exterior diameter. Following that, metal rings 3 are placed on the reinforcing bar 1 and the pressed-on sleeve 5. The subsequent pressing process produces a socket joint of high tensile strength. The number of metal rings is determined by the tensile forces to be transferred, and the same applies to the length of the connecting socket 4 which should be approximately 7 times the diameter of the rebar. This type of connection can also be used to advantage for pressing sockets onto pipes, cables, or ropes, or for attaching the same to each other.

Patent Claim

Pressed-on socket connection for concrete reinforcing bars and similar items, consisting of a socket that is placed over the butt joint and is pressed on step-by-step, characterized by the feature that hardened metal rings (3) are placed between the smooth surfaces to be pressed together, either on one side or on both sides of the butt joint (6) of the reinforcing bars (1; 11; 2) between the rebar (1) and the connecting socket (4), or between the rebar (11) and the sleeve (5), and also between the sleeve (5) and the connecting socket (4).

Attached: One page of drawings